also provide toughening by comprising a mixture of non-structural thermoplastic fibres and structural fibres.

Preferably the veil comprises no more than 70% non-structural thermoplastic fibres, more preferably no more than 60%. The veil may contain a minimum of 20% non-structural thermoplastic fibre. The amount of non-structural thermoplastic fibre is however determined by the need to maintain an appropriate overall structural fibre content within the preform.

The veil may also contain curing agents. If the veils are distributed throughout the preform or attached to all fabrics used in the part, then it would be possible to remove the curing agents from both the resin and from the other materials used to form the preform.

A preferred feature of such a veil is the presence of a binder material distributed on or in the veil which is, preferably, activated by the resin, preferably, by the temperature of the resin. A suitable binder is a thermoplastic with a melting point lower than that of the incoming resin. Alternatively, the resin temperature may be raised subsequent to ingress into the veil to thereby activate the binder. It is also possible to coat the binder directly onto the surface structure which is then placed between the layers of the structural component to be subsequently temperature activated but this is not as convenient as incorporating it into the veil.

In a preferred feature, the temperature of the incoming resin dissolves the binder but is not sufficient to commence curing which then takes place in a subsequent heating step. In this manner, thick sandwiched fibre fabrics and textiles may be securely bound together to form the preform prior to the curing step.

Preferably, the resin is a thermosetting resin, more preferably, an epoxy resin.

The preform may include a textile which may be a woven or non-woven fabric. The textile may comprise a hybrid yarn i.e. structural fibres and toughening fibres commingled in a hybrid yarn or the textile may comprise

structural yarn and toughening yarn mixed in a single textile. Preferably the toughening fibres are commingled with the structural fibres to form the hybrid yarn. Hybrid yarns with different ratios of non-structural thermoplastic fibres and structural fibres may be used in the same fabric or textile. Similarly hybrid yarns containing mixtures of different non-structural thermoplastic fibres and structural fibres may be used in the same fabric, textile or preform.

The basic concept of using hybrid yarns can be varied considerably. It is possible to replace all yarns in a preform with a hybrid yarn, or alternatively to replace only a section. Furthermore a large preform may consist of zones of conventional or toughened fabrics according to the needs of the part. This offers a processing advantage in that a single resin system can be used for a large part but the properties of the composite can differ in terms of toughness, and temperature capability from place to place – hence making one shot moulding of complex structures more feasible.

The properties of the composite can be varied widely by making the preform of different forms. For example, with a woven fabric the pattern in which the structural fibres and the thermoplastic fibres are provided will have an effect on the overall behaviour of the composite. The use of a structural reinforcement in the form of a textile therefore enables great versatility.

Embodiments of the present invention will now be further described with reference to the accompanying examples and drawings in which:-

Figure 1a shows a schematic laminar composite in accordance with the present invention;

Figure 1b shows the upper layer of the laminar composite of Figure 1a with a schematic impact region;

Figure 1c shows the schematic construction of the upper layer of the laminar composite of Figure 1a;

Figure 1d shows an exploded schematic view of yield zone 2 shown in Figure 1b;

Figure 2a shows a hybrid veil sandwiched between two structural layers in a laminate;

Figure 2b shows a possible construction for the hybrid veil of Figure 2a;

Figure 2c shows an alternative construction for the hybrid veil of Figure 2a;

Figure 3 shows absorbed energy versus volume fraction x thickness for various examples, and

Figures 4 to 6 show plots of impact strength as a function of thickness x volume fraction of fibres for a composite formed from glass fibres alone, Figure 4, glass fibres and polypropylene fibres, Figure 5, and glass fibres and polyamide fibres, Figure 6.

Figure 1a reveals a composite with a laminar structure of three superimposed identical flat rectangular layers: upper layer 3a; middle layer b and lower layer c. The internal structure is shown more clearly by Figure 1c which is an explosion of inset 4. The explosion shows each layer is formed from a hybrid fabric comprising yarns of structural fibre, e.g. carbon fibre interspersed with yarns of thermoplastic fibre set in a thermosetting resin matrix.

Figure 1b and Figure 1d show schematically the effect of an impact on the surface of the upper layer 3a. In particular, Figure 1b reveals a series of diagonal linear yield zones from the theoretical impact and Figure 1d shows an explosion of a linear yield zone 2 and reveals that the yield zone corresponds to a thermoplastic yarn extending in the composite layer.

Referring to Figure 2, this shows a schematic laminar composite construction similar to that of Figure 1 but with a hybrid veil sandwiched between two layers of textile. The sandwiched veil introduces toughening into the textile composite. Two alternatives of the veil construction are shown in Figures 2b and c. Figure 2b shows schematically the construction of mixed structural and non-structural fibres and thermoplastic powder whereas Figure